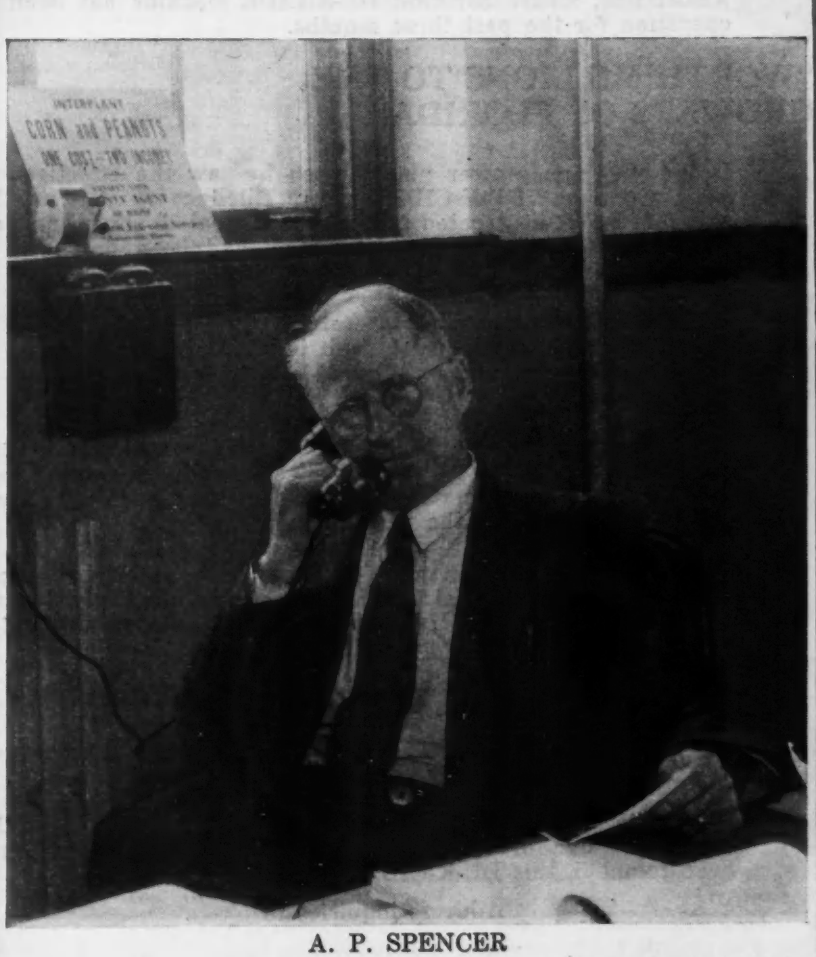
The Citrus Industry



A. P. SPENCER
who on June 30 will retire as Director of State Agricultural Extension Service after 37 years of service.

"Not A Single Decayed Orange In 3 Months Operations"

. . . That is the report from the Winter Haven Citrus Growers Association, where our first DE-K-CIDE machine has been in operation for the past three months.

"WORTH MILLIONS TO THE GROWERS OF FLORIDA"

Is the way one grower put it when he saw the effectiveness with which our DE-K-CIDE process filled every pore in the skin of the fruit treated . . . how it sealed scratches and "plugged" the stem ends where they had been damaged in picking.

DE-K-CIDE treated fruit retains the original flavor and taste of such fruit indefinitely. We urge every grower to make this taste test personally.

The action of the rubber, chemicals and machinery in our DE-K-CIDE operation has been perfected and coordinated to a point where it now obtains results which have been unsuccessfully sought after for the past 50 years.

Shrinkage and wilt, as well as decay, are greatly reduced, while the polished finish which the treatment gives fruit treated by the DE-K-CIDE process, all add measurably to the value of the fruit in the market.

THERE IS NO GUESSWORK ABOUT THE ELIMINATION OF YOUR PROBLEMS OF DECAY IN SHIPPING WHEN YOU USE THE DE-K-CIDE METHOD.

We invite your closest investigation of these claims . . . the answer to one of the industry's most serious problems has been found in this DE-K-CIDE machine.

Address inquiries to

E. M. BROGDEN

P. O. Box 50, Orlando

Some Insecticides And How To Use Them...

A. N. TISSOT
Entomologist, Florida Experiment Station

Since Man first began to cultivate crops he has been troubled by insect pests and plant diseases. Primitive Man attributed these pests to the visitations of evil spirits, and through superstition tried to combat them by means magical rites and incantations. When men became more enlightened they tried more practical methods of fighting insects and began to put things on their plants to kill the insects or drive them away. The oldest known record of an insecticide is Homer's mention (about 1000 B. C.) of the "pest-averting sulfur". Other early writers through the centuries mentionad a variety of materials as insectitides, such as lye, soap suds, whitewash, fish oil, turpentine, sulfur, and decoctions of tobacco and wormwood. Although some of these things have insecticidal properties, it was more or less an accident if the particular one chosen was effective against the pest for which it was used.

The use of insecticides continued to be a rather haphazard affair until about 100 years ago. At that time the spread of the Colorado potato beetle and the imported currant worm in the United States made agriculturists more conscious of the need for insect control. The seriousness of these pests stimulated planned experimental work with insecticides, which has expanded and grown through the years. As a result of this work hundreds of different insecticidal materials have been developed and new ones are constantly appearing. The array of new insecticides that have been developed during the past few years is rather confusing even to entomologists, so it is not at all surprising that many people are bewildered by them. However, this need not cause any great concern, for a knowledge of a few general principles of insect control is all one needs to deal effectively with most of the pests that are likely to be troublesome about the home and garden.

Insects are divided into two great classes on the basis of their mouth parts and are commonly designated as chewing insects and sucking insects. The chewing insects have well developed jaws and they bite off and swallow pieces of food. The sucking insects have a very fine needle-like tube which is thrust into the tissues of plants or animals and through which they suck out sap, blood, or other liquid foods. Chewing insects are generally controlled by chemicals which are called stomach poisons, and sucking insects by materials which are designed to kill by contact. Stomach poison insecticides may be applied as sprays or dusts on the insects' usual food, such as the surface of plants; they may be mixed with certain attractive food materials and used as baits, such as ant poisons and cutworm baits; or they may be applied so that the insects accidentally swallow them, such as sodium fluoride dusted on pantry shelves to control roaches.

Contact insecticides are applied in such ways that they come directly in touch with some stage of the insect, such as the egg, the larva, the pupa, or the adult. They kill by entering the breathing pores or by clogging them so that air cannot enter, or by penetrating directly through the body wall of the insect and injuring or destroying the internal organs. Insecticides in this group also may be used either as sprays or as dusts.

(Continued on page 8)

FOR QUALITY INSURANCE

Use d/p DOLOMITE

CORRECT acid-alkali balance in your soil and supply plenty of essential calcium and magnesium through annual applications of d/p DOLOMITE, and you'll find that you've taken a long step toward quality insurance. This *double value* of d/p DOLOMITE makes good fertilizers give better results... and unlocks acid-frozen plant food already in your soil. One application a year gives exceptional results. Plan now to apply d/p DOLOMITE!

DOLOMITE Products, Inc. OCALA, FLORIDA

MODERN PASTURE IMPROVEMENT METHODS PAY BIG DIVIDENDS

We're Proud as Peacocks of Our New Factory But We Have Greater Pride In the Men Who Represent Swift's Growers Advisory Service!

We found that by studying conditions right out in the groves we could offer suggestions that would make the use of our plant foods more profitable to a grower. That's why we spend so much time and effort in training Swift's Growers Advisory Service Representatives. We firmly believe that helping growers make more money is the way to make friends and increase our business. Here in Florida, we have a whole staff of trained advisers like Wayne Dean, living in Miami ready to serve you . . .

WAYNE P. DEAN . . . A Swift & Company Plant Food employee in Florida for the past six years, he is also a University of Florida Agriculture graduate. He holds a master's degree in Entomology and before joining Swift, was employed in the Bureau of Plant Quarantine of the U.S.D.A. Many growers and dealers are already familiar with Dean and his splendid work.

Lean on Swift's many years of broad experience to make your grove operations more profitable. Telephone or write for further information. No cost or obligation.

Swift & Company • Plant Food Division

Winter Haven, Florida

The Citrus Industry
EXCLUSIVE SPECIALIZED CITRUS PUBLICATION
Issued Monthly
Representative of every interest
Representing no special interest

Publication office at Bartow, Florida. Entered as second class matter February 16, 1920, at the post office at Tampa, Florida, under the act of March 3, 1879. Entered as second class matter June 19, 1933, at the post office at Bartow, Florida, under act of March 3, 1879.

The Role Of Biological Balance In Citrus Insect Control

JAMES T. GRIFFITH, JR./

In the past, the use of the term, "Biological Control", has been often limited to a consideration of the control of an insect pest by one of its insect or disease enemies. It is the purpose of this article to expand the meaning of "Biological Control" to mean the control of insect pests by a better understanding of how those insects live, what they require for food, what their natural enemies are, how effective these enemies are, and a host of other factors concerned with the normal relationships between insect pests and their environments. At first glance, this may not appear practical, but a closer examination will adequately demonstrate that a better understanding of any insect pest will render it an easier subject for control.

In order to discuss the broader aspects of "Biological Control", it is first necessary to understand the meaning of "Biological Balance" and to see by specific example how a better understanding of an insect may lead to more economical and satisfactory control. "Biological Balance" means the balance that exists between any insect and its environment. There are many factors which can disturb that balance. Some make it more difficult for the insect to reproduce and multiply. Others are favorable to rapid reproduction. In Figure 1 there is an illustration of "Biological Balance". The beam of this analogous balance represents the multiplication or the reproductive capacity of scale insects on a citrus tree.

On one side of the balance are listed several factors which result in increasing scale populations. Thus, warm weather, a green healthy tree, the presence of residue (be it zinc, copper, road dust, or anything else) are all factors which favor the scale in its attempt to reproduce and survive (see Thompson; 2, 4, and 5). On the other side we have these opposites, cold weather, no residue, insecticide, and a chlorotic or unhealthy tree. These in turn cause the balance to tilt to the left and result in decreasing populations. These are only a few of the known factors. Undoubtedly there are many more which are neither known nor understood. The point to be emphasized is that these and other factors are constantly at work in citrus groves. They constantly affect the balance between the tree and the scale living on that tree. Sometimes one is more important than another. Thus, there are a multiplicity of factors which affect the course of an insect infestation and they are often delicately balanced. Maybe residue from a fertilizer application is making things more satisfactory for scale increase, but at the same time, the lady beetle population in the grove is rapidly increasing. One may balance the other for a time, but then another factor may tip the balance in either direction. It is the thesis of this article that by a proper understanding of these biological factors, it will be possible to make more intelligent and better recommendations, particularly for those groves which present special problems.

Most groves in Florida can be satisfactorily managed on a standard fertilizer and insecticide program, but there are many individual blocks which are particularly subject to scale infestations of one kind or another, or which always have purple mites when adjacent groves do not. It is believed by the author that once we understand the factors affecting the relationship between an insect and its environment, we will be able to satisfactorily control that insect under any and all circumstances.

(Continued on page 20)

/Entomologist, Citrus Experiment Station, Lake Alfred, Florida, at meeting Florida Agricultural Research Institute, Orlando, Florida.

Effect Of Fertilization On Cold Damage . . .

By S. Lloyd Frisbie

There may be other individuals in Florida who know less about the subject of fertilization than the writer, but even with our meagre understanding of the subject we were able to observe some outstanding examples of what proper fertilization can accomplish in providing protection for Florida citrus against the ravages of cold. Conversely we discovered what the lack of proper fertilization can do also.

At the invitation of Dr. A. F. Camp, director of the Citrus Experiment Station at Lake Alfred, we recently viewed several experimental blocks in the groves which surround the station, where Camp pointed out to us various blocks of trees which had been treated with various fertilizer formulas.

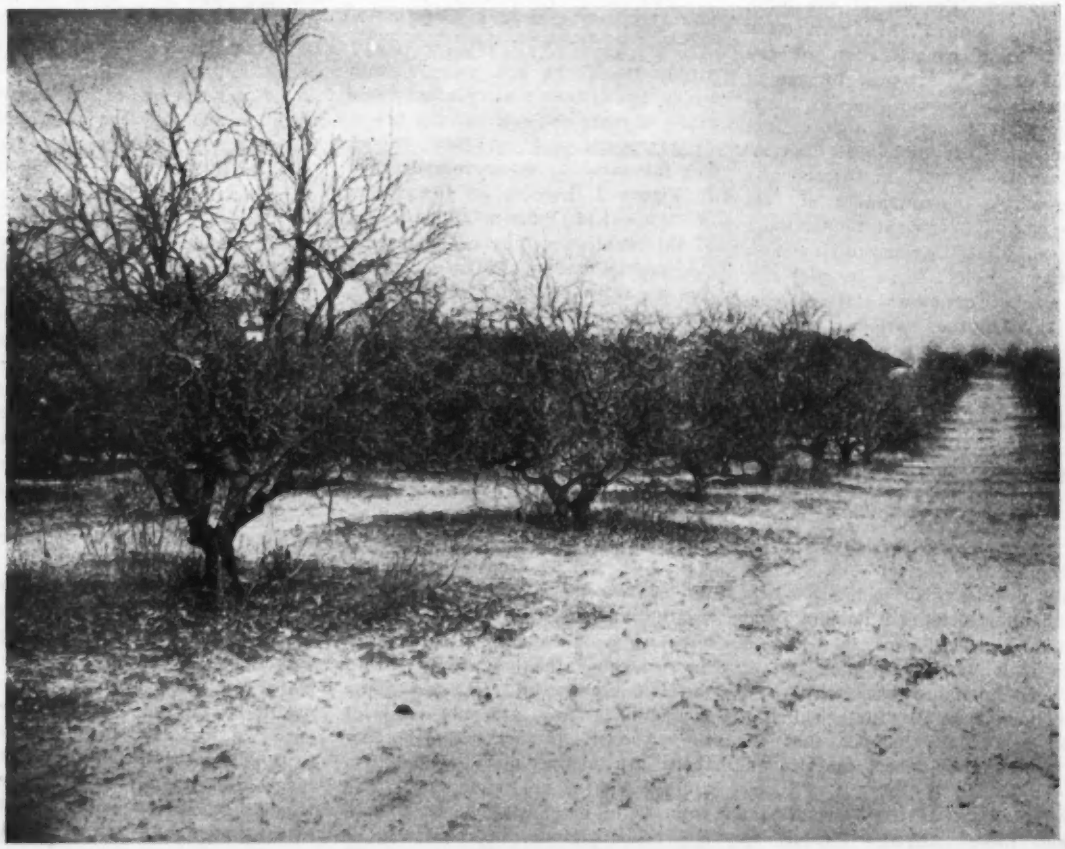
In the first block which ran down a slope were three rows of trees which had received regular applications of the straight NPK fertilizer application which was in exclusive use up to about ten years ago, while in the next three rows of trees the fertilizer plant food application included not only the customary amounts of nitrogen, phosphorus and potash, but also included adequate amounts of magnesium, manganese, copper and zinc.

The contrast was astounding. The trees in the first block were still almost completely defoliated, while in the second block virtually all signs of the slight defoliation they had experienced had disappeared and a heavy crop of new fruit was already set.

The freeze which occurred in February brought cold which remained between 20 and 21 degrees in this block for five and a half hours.

Most amazing of all to us was Camp's statement that the trees which received the minor elements, not only suffered little from the cold, but that the heavy crop of fruit which they bore was so little affected that virtually a hundred percent of the fruit on the trees at the time of the freeze was marketed 45 days afterwards.

Camp stated that there was evidence of defoliation on the minor element plots but that it was small compared to those receiving no minor elements which were so severely



Pictured trees showing effects of February cold in experimental plot where no minor elements were included in fertilizer used.

affected that it will probably be two or three years before those trees will set another crop of any kind.

Other plots wherein the same contrast was noted included oranges of various varieties as well as three varieties of seeded grapefruit and one plot of Marsh seedless grapefruit. The Marsh seedless variety, Camp reported, under any conditions appear to be more resistant to cold damage than any of the seeded varieties.

Camp stated that the knowledge of the effect of the use of minor elements in fertilization was far from a new idea, since the results of the experiments the writer observed were also evident in the cold weather damage suffered in January and February of 1940, and in February 1943 as well as in the cold spell in February of this year.

We know that our reactions are not at all technical but it would seem, after this trip, that somehow or other the minor elements used in the fertilizer must provide some internal heat which protects the trees from the ravages of severe cold. Really, we gathered, trees which include these elements in their plant food ration are just naturally so much more healthy than those not so treated that they can take punishment from cold which other trees cannot stand.

Outstanding evidence of this fact was shown in one plot where magnesium had been purposely left out of the fertilizer formula and in this plot the bark of the trees was split and many of the limbs were dead, while in the next row of trees where sufficient magnesium had been used the foliage was luxuriant and the new crop set was heavy.

It was suggested that without the use of these elements Florida would more than once have faced the tragedy which overtook the citrus industry in this state during the big freeze back in 1895.

Camp, in answer to a question from us, stated that a low organic fertilizer with proper minor elements in it would do a much better job for citrus trees than plain organic fertilizer without those elements. He added further that a heavy crop could be carried without damage to the tree when adequate minor elements were included in the fertilizer.

The use of these essential minor elements in fertilizer, Camp stated, was first generally recommended back in the middle 30's and the growth of these essentials as ingredients in fertilizer formulas increased from 12.4 percent in 1936 to 47.8 percent in 1943.

Further evidence of the growth of the use of minor elements in fertilizers may be found in the increase in their use as shown by figures released by the state department of agriculture, which shows that 2630 tons of copper were used in fertilizers in Florida in 1940, while the tonnage had increased to 9277 tons in the 1943-44 season. In the same period magnesium had increased from 4920 tons in 1940 to 11.433 tons in 1943-44, while the use of zinc had jumped from 754 tons to 1660 tons in the same interval.

According to charts prepared in Camp's office the tremendous jump in the state's crop of citrus which has occurred since 1936 is directly attributable to the use of these

(Continued on page 15)

Shown here are pictures of trees in an adjoining experimental plot where essential minor elements were included in the fertilizer applied. This picture was taken the same day as the one in which the trees are shown completely defoliated.

Spencer Will Retire June 30 As Head of Extension Service

A. P. Spencer, director of the State Agricultural Extension Service, is retiring June 30 to end an active career of leadership of Florida county and home demonstration agents which began on September 15, 1910.

Coming to the state with a corps of farm demonstrators working for the United States Department of Agriculture, he was a pioneer in agricultural extension work in Florida and is the only member of the staff who has served continuously since the Agricultural Extension Service was officially established by Congress in 1914.

In 1914 he became district agent with the Extension Service as soon as it was established, and moved his headquarters to Gainesville. In 1916 he was made assistant director of extension and in 1918 his title was changed to vice-director. On November 1, 1943, he became director, succeeding the late Dr. William Newell.

Mr. Spencer has helped steer the course of the Extension Service through emergencies associated with the boll weevil's invasion of cotton fields, World Wars I and II and the postwar periods, and the adjustment period beginning in 1933. He is known in each of Florida's 67 counties, particularly those employing county and home demonstration agents.

His name appears as author or co-author on 10 of the first 12 bulletins published by the Extension Service. The 14 bulletins which he prepared or helped write cover such subjects as foundation plantings for Florida homes, vegetable crops, Irish potatoes, sweet potatoes, sugar cane, peanuts, sub-irrigation and others.

For excellence of his work, he was awarded a certificate of recognition in 1943 by Epsilon Sigma Phi, fraternity of veterans extension workers of which he is a past president.

Born in Canada 70 years ago, he attended grammar and high schools near Toronto. Enrolling at Virginia Polytechnic Institute later, he was awarded bachelor and master degrees by this institution.

Dr. H. Harold Hume, provost for agriculture at the University of Florida, who announced his retirement, praised his services highly.

"For nearly 37 years Mr. Spencer has served Florida agriculture in a quiet, unruffled, dignified and effective manner", he said. "He has given unstintedly of his energies and abilities that Florida farm families may enjoy richer lives. His entire career in Florida has been centered in extension work and demonstrations in farm homes and on farms throughout the state."

SOME INSECTICIDES AND HOW TO USE THEM

(Continued from page 3)

There are some materials which act both as stomach poisons and contact insecticides. They may kill some insects by direct contact, while others may be killed only if they eat some of the material. Rotenone and DDT are two well-known examples of this type of insecticide and their effectiveness against such a wide range of pests may largely be due to this double action.

The fumigants constitute still another type or class of insecticides. As the name implies, fumigants are materials which give off gases or fumes that kill insects by contact with them. They are ordinarily used for controlling pests of grains and other stored products, or for fumigating houses, ships, and other enclosed places, and for killing soil-inhabiting insects.

There is much more to insect control than just going out with a duster or sprayer and putting on the plants something that someone said worked fine for them. The insecticide and the manner of application must be suited to the particular pest at hand or the results will almost certainly be disappointing. One of the first things to determine is the type of insect concerned. Chewing insects can usually be recognized by the visible injury they cause by eating portions of plants. Sucking insects do not make visible holes, but their feeding may cause wilting, yellowing, or a general unthrifty appearance. If you cannot be sure of the type of insect, collect a few specimens and take them, together with some of the injured plants, to your insecticide dealer. He probably will recognize the pest and can tell you what insecticide is needed for controlling it.

Insecticides are almost always sold under proprietary or trade names which may or may not indicate the nature of the material. This means that one must study the labels to learn what the active ingredients are. The stomach poison insecticides usually contain arsenicals, such as lead arsenate or calcium arsenate; or fluorine compounds, such as cryolite; or some of the new synthetic insecticides, as DDT and benzene hexachloride. The active ingredients in the common contact insecticides are plant derivatives, as nicotine, pyrethrins, rotenone, and sabadilla, or synthetic materials of various kinds. Oftentimes, two or more insecticidal ingredients will be combined to produce an insecticide that is effective against a wider variety of pests.

The labels on insecticide containers usually indicate how the material should be used. Insecticides for use as sprays almost always are sold in highly concentrated form and must be diluted with water or other liquids before applying them. Insecticidal dusts on the other hand are more often sold ready for use. If the insecticide must be diluted, do not guess at the amount to use, but measure all ingredients accurately. If this is not done, the mixture may be so weak that the insects will not be killed, or, on the other hand, it may be too strong and the plants will be injured.

With very few exceptions, insecticides are poisonous to human beings and domestic animals and certain precautions must be taken in using them. Like machinery, firearms, electricity, and other familiar things which are potentially dangerous, insecticides are quite safe if handled in the proper manner. Poisonous insecticides can be used on flowers and ornamentals and on fruits and vegetables during the early stages of growth. On beans, tomatoes, peppers, and similar vegetables, poisons should not be used after the pods begin to set or the fruits are half-grown. They should not be used on cabbage and lettuce after the heads begin to form or on leafy vegetables later than three weeks before harvest time. If the plants become infested in the late stages of growth, one must depend on a non-poisonous insecticide such as rotenone or pyrethrum to control the pests. Fruits and vegetables that have been treated with insecticides should always be washed

thoroughly when they are prepared for eating.

Here are a few simple rules for the safe handling of insecticides used about the home or in the garden:

1st: Take extra precautions with the more poisonous materials, especially the arsenicals—lead arsenate, calcium arsenate, and paris green; the fluorine compounds, certain of the new synthetic insecticides.

2nd: When mixing and applying insecticides, take particular care to keep the materials out of the mouth, nose, and eyes, and avoid excessive or prolonged contact with the skin. Always wash the face and hands thoroughly after handling any insecticide.

3rd: When spraying or dusting, keep up-wind of the discharge nozzles to avoid breathing the insecticide and to prevent it from settling on the clothing or body. Clothing worn during the spraying or dusting should be washed frequently to prevent accumulation of residues.

4th: Keep all insecticide materials in tightly closed and plainly marked containers. Have a special place for storing them, prferably under lock, and be sure that they are well out of the reach of children or persons unfamiliar with insecticides. especially, do not keep sodium fluoride and other household insecticides where foods are stored. There have been instances of insecticides being mistakenly used for baking powder.

5th: Do not leave open containers of insecticides or batches of prepared sprays or dusts where passing livestock can lick them. Be careful to protect domestic animals from being poisoned through feeding on crop remnants bearing spray residues, or by drinking water which has been contaminated by insecticides.

6th: Burn or otherwise destroy empty bags and other containers of insecticides. Those that contained arsenicals must be burned in the open to avoid exposure to poisonous fumes. Bury discharged insecticide materials which are no longer useful, at least a foot deep, and in places where water supply or drainage will not be endangered.

7th: Guard against leaving poisonous residues on harvested fruits and vegetables.

In conclusion, there is no perfect insecticide which will control all insect pests under all circumstances, and it is doubtful that such materials ever will be available. When DDT was first released it was hailed as the wonder insecticide which would solve all insect problems. While it is extremely effective against some pests, it is of little value against others, and the same things may be said of the many other new insecticides which have recently been produced. So, it still remains that Man, to win the battle against pests and parasites, must ever increase his knowledge of insecticides, must use them correctly and at the most opportune time.

Summer oils...

The added safety factor
in the use of VOLCK OILS
permits their use
in sufficient dosages
to do any effective job
i nkilling scale.

Summer oils
(the VOLCK kind)
should be applied
as early as possible.

NACO FIELD MEN
are qualified to offer
CORRECT recommendations
in the use of summer oils,
and to assist you
in planning an adequate
fertilizer program.

NACO FERTILIZER COMPANY JACKSONVILLE 1 .... FLORIDA

The Citrus Industry

with which is merged The Citrus Leaf
Exclusive publication of the Citrus Growers and Shippers

Publication Office 550 North Broadway, Bartow, Florida
Telephone 269

Published Monthly By
ASSOCIATED PUBLICATIONS CORPORATION

S. L. FRISBIE - - - - - - President-Editor
S. LLOYD FRISBIE - - Sec.-Treas.-General Manager
LOYAL FRISBIE - - - - Business Manager
RICHARD R. FRISBIE - - - Advertising Manager
A. G. MANN - - - - - Production Manager

Subscription, $1.00 per year in advance
Outside Continental United States, $2.00 in advance

GOOD APPOINTMENTS

Following out the recommendations of the citrus advisory committee, Governor Caldwell has named the six men who are to replace members of the Florida Citrus Commission whose terms expire on May 31.

Clark Brown, Jr., Arcadia grower, has been named to serve out the remaining year of the Sixth District term of Jeff Flake of Wauchula, who resigned to become state senator, following his election at a special election in his district.

O. C. Minton, Fort Pierce grower, was appointed to a two year term beginning June 1 to succeed J. J. Schumann, Vero Beach grower, whose District Five term expires on May 31.

Reappointed to two-year terms were C. C. Commander, Tampa, manager of the Florida Citrus Exchange, in District One; W. E. Bishop, Citra grower, in District Three; Rollie Tillman, Lake Wales grower, now Chairman of the Commission; and Latt Maxcy, Frostproof shipper, both in District Seven.

The reappointment of the four present members of the Commission, together with the holdover members who have so ably served the industry in the past, assures the continued outstanding leadership of the Commission in service to the citrus growers of the state. The two newly appointed members are of the same high calibre and distinguished service as those with whom they will serve. Thus constituted, the Commission may be counted upon to continue the good work which that body has performed in the past.

All of the appointments were made upon the recommendation of the citrus advisory committee headed by Tom B. Swann of Winter Haven.

A GREAT INSTITUTION

It was the privilege during the past month of a member of the executive staff of this publication to visit and inspect the workings of the Citrus Experiment Station at Lake Alfred.

While long acquainted with the extensive work being done by Dr. A. F. Camp, vice-director in charge, and his efficient fellow-workers at the Station, this personal inspection tour brought to light surprising features of which, as an outsider, our staff writer had never dreamed.

The work being done by the scientists and experts at the Station, the series of experiments and the painstaking research being carried on are of invaluable benefit to the citrus growers of Florida. With the greatly expanded facilities now underway the workers will be able to even more efficiently carry on their work in developing new cultural practices and grove management.

Every citrus grower could with profit to himself visit the Station and consult with the corps of experts there on his many grove problems. He will find the workers there not only willing but anxious to assist him in the solution of those problems.

CHANGES IN EXTENSION SERVICE

After thirty-seven years of continuous and valuable service in the Florida Agricultural Extension Service, A. P. Spencer will on June 30 retire from active work with the Department. During his connection with the Service he has evolved and promoted numerous and valuable cultural practices and is the author of many valuable bulletins.

Dr. Spencer is to be succeeded on July 1 by H. G. Clayton who has been connected with the Extension Service since March, 1917. He has been instrumental in securing for Florida and the South many beneficial rulings which have advanced farm living and conservation and improvement of resources.

Both Mr. Spencer and Mr. Clayton are widely and favorably known in Florida agricultural circles.

HORTICULTURAL SOCIETY CHANGES DATE

At the last meeting of the Florida State Horticultural Society held in Miami, it was decided to change the date of the annual meetings from spring to fall. At a recent meeting of the officers and executive committee of the Society, it was decided to hold the 1947 meeting in St. Petersburg on October 28, 29 and 30. These meetings have always been of great interest and benefit to the citrus growers of the state, and the officers are confident that the meeting this fall will be fully up to the high standard of past sessions.

Dry weather during the early part of May which resulted in heavy droppage of fruit in many sections of the citrus belt, has been succeeded during the latter part of the month by copious showers in many sections. While growers are not now anticipating as heavy a crop as seemed probable earlier in the season, present indications are that the fruit will be of excellent quality.

Would Protect Groves From Forest Fires

Writing in support of a Forest Conservation Bill soon to be introduced before the Florida legislative session, C. H. Coulter, State Forester, says:

In 1945 careless wildfires caused some $8,000,000 damage to 7,000,000 acres of woodland areas in Florida. The extent of such damage to groves, dwellings, fence posts, and the like cannot be furnished by me, however, we know it was considerable.

In the 1947 Legislature a bill for the conservation of forests will be introduced which as you know if put into effect will conserve our water, soil and wildlife as well.

Wildfires yearly take a toll of land and groves which could be producing citrus and certainly we should make every effort to increase rather than decrease both our forestry as well as citrus.

The proposed Forest Conservation Bill to be introduced in the 1947 Legislature is entitled:

'An Act to provide State Forest Fire Protection and the systematic care and management of forests and wild life areas in Florida; for protection of forest lands; to promote reforestation on denuded, understocked and submarginal areas within the State, defining forests and forest fire; and providing for the financing thereof." In brief, this bill provides for:

1. The establishment of a system of fire prevention and protection throughout the State in all areas desiring and needing forest fire protection, to be financed from State and Federal funds.

2. Increasing tree planting and forest management assistance to all landowners throughout the State.

3. The establishment of County Forestry Committees in each county to meet at least twice a year to advise and assist in formulating the annual Forest Fire Protection Plan for the county, and in general to assist in the forestry program in its county.

4. Each County Forestry Committee will consist of five (5) members, composed of residents of the county. One committeeman shall be a member of the State Legislative Delegation from that county, to be selected by the entire Delegation from such county. The Legislative Delegation shall also appoint two (2) members of the Committee who shall be landowners or representatives of a forest industry, and two (2) members, who are landowners or representatives of a forest industry, shall be appointed by the Florida Board of Forestry and Parks.

5. Committee members will be paid actual mileage and $6.00 per day for attendance at regular meetings.

6. A sum of $1,750,000 annually to be appropriated from the General Revenue Fund of the State for the two-year period July 1, 1947 to July 1, 1949, to carry on this program. This will be supplemented by Federal matching funds, now $400,000, which will be increased as additional State funds are invested.

7. Counties now making payments to the Board of Forestry and Parks for forest fire protection are relieved of paying further assessments. (Individuals and Group Cooperators will also be exempt.)

Multiwalls help protect your fertilizer against "caking" when exposed to moisture. They are made with multiple layers of strong kraft paper, and are equipped with special plies that help prevent moisture vapor penetration ... and help keep fertilizer free flowing.

Multiwalls are economical and convenient, too. Ask your supplier to ship your fertilizer in Multiwalls and learn at first hand why they are the ideal container for fertilizer.

4 REASONS WHY YOU'LL PREFER MULTIWALLS

1 ***Protection*** against moisture-vapor penetration and "caking."

2 ***Economy*** — There is no siftage and they empty clean.

3 ***Ease of Handling*** — They are compact, convenient, easy to open and easy to empty.

4 ***Cleaner*** — Multiple walls of paper permit no leakage.

St. Regis MULTIWALL PAPER BAGS

ST. REGIS SALES CORPORATION
(Sales Subsidiary of St. Regis Paper Company)
1925 O'Sullivan Building
Baltimore 2, Md.

FLORIDA REPRESENTATIVES { *W. M. Palmer, Ocala; Phone 261*
T. F. Sheridan, Jacksonville; Phone 7-7173

Experimental Chemical Treatments And The Prevention Of Decay In Citrus Fruits...

E. F. HOPKINS
and
K. W. LOUCKS/1

Introduction

The high incidence of decay in citrus fruits caused by stem-end rots and molds during the marketing period has in recent years intensified the search for methods for controlling these diseases. The present fruit season (1946-47) has been one in which exceptionally high losses have been experienced, making the need for preventing them more urgent. Weather conditions appear to have contributed to this. In the early part of the season relatively high prevailing temperatures prevented the normal natural color break and necessitated long periods of ethylene treatment in the degreening process. This increased the amount of stem-end rot. Later in the season the freeze was responsible for high percentages of mold.

For a number of years the authors have been investigating methods for the control of decay, particularly in oranges, and in this work many chemical treatments have been tested. The advantage of treating the fruits in a fungicidal solution in the packinghouse process, especially if it can be done without appreciably slowing up the processing is obvious.

The question is frequently asked, "Why, with all the good fungicides available is it not possible to dip the fruits in a fungicidal solution and eliminate the trouble?"

The answer to this is that there are to be considered a number of factors, the most important of which is the penetrating ability of the fungicide. The fungi causing the stem-end rots are harbored in the button tissues of the fruit and are relatively deep-seated. Therefore, in order to kill the stem-end rot fungi any chemical used for this purpose must penetrate into the tissue concerned. Furthermore the treatment must not cause peel injury or leave an objectional odor or taste. Also it must not be determintal to health. The cost is another factor.

The compound thiourea while not exceptional as a fungicide meets practically all the above requirements and thus far is the best chemical we have used experimentally for preventing both stem-end rot and mold in citrus fruit. However, because of its tissue penetrating power a slight amount of it (a matter of a few parts per million) will be found in the juice of fruits treated with this substance.

For this reason the United States Food and Drug Administration has not yet passed on the use of thiourea for treating citrus fruit commercially. It is our understanding that they wish to assure themselves by long time trials that, even in these minute quantities, the substance is in no way detrimental to public health before allowing its use.

Meanwhile investigations have been in progress here in a search for other possible methods of stopping this loss from decay.

Of a large number of chemical compounds which have been treated at this Station to determine their possible effect in the control of stem-end rots and molds in oranges, various ones have been discarded for one reason or another. Two, however, 2-Aminopyridine and 8-Sodium quinolate showed considerable promise and work on them has been continued.

2-Aminopyridine

Experiments using solutions of this chemical in treating fruit to prevent decay were begun in October 1946, and in this article some of the results obtained during the 1946-47 fruit season are presented.

The first tests were "button treatments" in which the buttons of the fruits were painted with a 3 per cent solution of 2-Aminopyridine. Since the stem-end rot fungi are harbored in the button tissues, a treatment of this type if effective, would prevent infection by stem-end rot organisms only and not appreciably effect the molds. The latter attack the fruit at any point on the surface where a wound or other injury is present.

The results of 2 such tests are given in Table 1. Hamlin oranges, degreened by gassing with ethylene for 48 hours and 41 hours respectively, were used. Comparison is made in each experiment with an untreated check and with thiourea at the same concentration.

Table 1. Prevention of stem-end rot in oranges with 2-Aminopyridine, buttons painted with a 3% solution. 3 weeks storage.

Exp. No.	Treatment	No. of Fruits	Stem-end rot %	Mold %	Total Decay %
F-5	Check	100	15.0	11.7	26.7
F-5	2-Aminopyridine	100	1.7	6.7	8.4
F-5	Thiourea	100	1.7	15.0	16.7
F-7	Check	100	54	24	78
F-7	2-Aminopyridine	100	1	7	8
F-7	Thiourea	100	9	7	16

/1 This investigation was carried on at the Florida Citrus Experiment Station, Lake Alfred, Florida, with funds provided by the Florida Citrus Commission, Lakeland, Florida.

2 Acknowledgement is due the American Cyanamid Company for furnishing samples of the chemical for use in experimental work, and results of screening tests for its effect on mold in oranges.

Excellent control of stem-end rot was obtained in both experiments. The data for mold also shows considerable reduction in the treated lots due to the fact that pulled fruits are frequently injured at the button end. In Experiment F-7 the results with 2-Aminopyridine are somewhat better than Thiourea at the same concentration, in this case 3%, altho Thiourea as generally used in experimental work (5% to 10% concentration) would undoubtedly be more efficient in eliminating decay.

Another button treatment test with 2-Aminopyridine was made on a commercial lot of Hamlin oranges. These were in bad condition after having been gassed 60 hours and subjected to the color-add process. The results are as follows.

No.	No. Fruits	Treatment	Stem-end rot %
1	116	Check	39
2	117	Check	41
3	104	2-Aminopyridine	8
4	107	2-Aminopyridine	6

Still another button treatment with 3% 2-Aminopyridine reduced the amount of stem-end rot showing in 3 weeks from 29% to zero and the total decay from 44% to 7%.

After obtaining these favorable results dipping treatments were made. The data for one of these experiments in which ungassed Hamlin oranges were immersed in 1%, 2% and 3% 2-Aminopyridine for 1 minute at room temperature are given in Table 2.

Table 2. Reduction of decay in oranges by dipping in 2-Aminopyridine solution. Fruit stored 2 weeks.

No.	No. Fruits	Treatment	Stem-end rot %	Mold %	Total Decay %
1	100	Check	37	36	73
2	100	2-Aminopyridine 1%	0	16	16
3	100	2-Aminopyridine 2%	0	10	10
4	100	2-Aminopyridine 3%	0	10	10

Perfect control of stem-end rot is shown and also good reduction of mold at 2% concentration and higher.

In the above experiments the oranges were not rinsed after the treatments. However, when the fruits are dipped in 3% 2-Aminopyridine, allowed to stand for one hour and then processed in the packinghouse machine, decay control is also obtained. This procedure is known as the "dip-stand" method and in it the fruits are thoroughly washed and rinsed so that the bulk of the chemical fungicide is removed from the surface.

Since this is the case, it indicates that the action of 2-Aminopyridine is fungicidal rather than fungistatic. The results of one of these experiments is shown in Table 3. Lots Nos. 1 and 2 were stored under controlled conditions at 72°F. and Nos. 3 and 4 packed in Bruce boxes and held under ordinary atmospheric conditions.

Table 3. Effect of 2-Aminopyridine on citrus decay. Dip-stand method in which the fruit is washed after treatment. Fruit stored 3 weeks.

No.	No. Fruits	Treatment	Stem-end rot %	Mold %	Total Decay %
1	100	Check	29	11	40
2	100	Dip-Stand	2	4	6
3	88	Check	38.6	14.8	53.4
4	90	Dip-Stand	1.1	8.9	10.0

Following the freeze which occurred early in February, Hamlin and Pineapple oranges were particularly susceptible to mold infection. The efficiency of 2-Aminopyridine in preventing this loss in Hamlin oranges harvested several weeks after the freeze is shown by the results presented in Table 4, and Figure 1 which depicts graphically the amount of total loss in the treated lot versus the check. The remarkable effect of reducing decay from 75% to 5% is shown.

The above data brings out the fact that 2-Aminopyridine has a definite action in controlling stem-end rot and mold in citrus fruits and for this reason may be of great value to the citrus industry in preventing the losses due to these causes.

From the results of extensive experiments we believe that the compound is not quite as effective as thiourea but superior to many other chemicals tested. The compound, 2-Aminopyridine, would lend itself to practical use in packinghouse op-

(Continued on page 14)

Rebuilding Citrus Trees

Whether it ever pays to top-work on undesirable citrus trees to some other variety, or to a better strain of the same variety, is a question about which every grower has his individual opinion. There is no denying that a good deal of topworking has turned out unsatisfactorily. So many citriculturists say that the best thing to do with an unwanted tree is to tear it out and plant a new one in its place. This means no production until the new tree reaches bearing age.

After many years of experimentation in California and Arizona. E. B. Bennett, veteran nurseryman and grower, has become convinced that topworking is profitable, provided it is done right in the first place and then proper care is taken until the tree is "rebuilt." He delights to show visitors trees that have been topworked wrongly and correctly, and to point out where he made his mistakes before he arrived at the practices which bring best results.

The error that has been most frequently committed, he says, is to give the tree no attention after topworking, or to entrust its care to a hired man who knows little and cares less about what ought to be done. The new buds are not looked after; suckers from the old growth are not kept brushed off, with the result that the tree is soon a mixture of two varieties.

Delayed Bad Effects

In his work Mr. Bennett has also found that cutting back and defoliating a tree shortly after the buds are inserted has unfortunate consequences that may not be apparent for a long time after. He has several trees at his place which apparently did fine for the first year after they were topworked. The new growth came out strong and vigorous. But the second year slowed down or ceased; some of the upper twigs and leaves even died.

Right by these are other trees, topworked at the same time, which never experienced that second-year "dieback". They were cut back gradually to the growth from the new buds. Always there was plenty of leaf surface to balance the root system, which never suffered any severe shock or period of starvation.

Protection in Winter

Under the method upon which he has standardized, if Mr. Bennett top-

(Continued on page 22)

EXPERIMENTAL CHEMICAL TREATMENTS AND THE PREVENTION OF DECAY IN CITRUS FRUITS

erations since it is very soluble in water, causes no peel injury to oranges in concentrations up to 5% (the highest percentage used) and leaves no odor or taste in the treated fruits.

Table 4. Effect of 2% 2-Aminopyridine on the control of rot and mold in oranges harvested after the freeze.

			One Week			Two Weeks			Three Weeks		
No.	No. Fruits	Treatment	% SER	% Mold	% Tot Dec.	% SER	% Mold	% Tot Dec.	% SER	% Mold	% Tot Dec.
1	100	Check	0	29	29	15	47	62	20	55	75
2	100	2% Dip	0	0	0	0	2	2	0	5	5
3	100	2% Dip-Stand	0	2	2	0	6	6	1	13	14

8-Sodium Quinolate

The compound 8-Hydroxyquinoline is well known to have excellent fungicidal properties. Thinking it might be of value in controlling decay in citrus fruits we tested first its effect on the stem-end rot and mold fungi in pure cultures. These tests showed that 50 parts per million added to the culture media would kill all the fungi concerned and that 10 ppm would greatly inhibit their growth.

However, when oranges were treated with solutions of the fungicide although a significant reduction of decay was usually obtained good control did not result.

Because the solubility of the compound in water is only about 0.1%, concentrations higher than this were not possible in these experiments. The low concentration and lack of penetration into the button were considered to be responsible for the results.

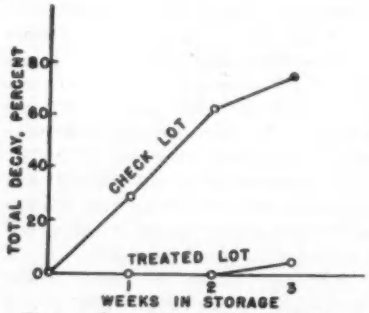


Figure 1. Action of 2-Aminopyridine in preventing decay in oranges following the freeze of February 1947. For details see Table 4.

To overcome this, 8-Hydroxyquinoline sulphate which is very soluble in water was next used. Excellent control of decay was obtained by dipping in solutions of 2% and higher using oranges of the Valencia variety late in the season, but when early and midseason varieties were treated this way, peel injury resulted to such an extent as to impair their market value.

This injury was caused by the acid reaction of the treating solution.

The next step was to prepare 8-Sodium quinolate. This was done by dissolving the 8-Hydroxyquinoline base (or sulphate) in sufficient sodium hydroxide to form the sodium salt. The alkalinity of the solutions was adjusted to pH 11.0 to 11.5. Under these conditions, excellent control of stem-end rot was obtained without peel injury and mold was greatly reduced. Data from a number of experiments are given in Table 5.

In this way a relatively high concentration of the fungicide at a high pH value was obtained without impairing its fungicidal value.

In a shipping test to Washington, D. C., by express the latter part of March 1947, in 1-3/5 bushel Bruce boxes, a 2-Aminopyridine treatment showed 7% of decay 15 days from picking, an 8-Sodium quinolate treatment 5% and the check lot 26%. These were both dip-stand treatments in which the fruits were thoroughly washed after being treated. About 150 Valencia oranges were used for each treatment.

Table 5. 8-Sodium quinolate and decay control in oranges.

Exp. No.	No. Fruits**	Concentration*	Method of Application	Stem-end rot % Treated	Stem-end rot % Check	Mold % Treated	Mold % Check
F-14	100	1%	Dip—80°F	3	18	9	15
F-18	100	1%	Dip—80°F	1	39	11	17
F-21	100	2%	Dip—80°F	0	26	7	17
F-27	100	2%	Dip—80°F	0	4	10	38
	100	2%	Dip—122°F	0	4	8	38
	100	3%	Dip—180°F	0	4	2	38
	100	3%	Dip-stand	0	4	4	38
	100	5%	Button Treatment	0	4	4	38
F-34	100	2%	Dip—110°F	0	14	9	59
	100	2%	Dip-stand	0	14	12	59
F-42	100	2%	Dip—80°F	0	12	14	54
F-45	100	2%	Dip—110°F	0	9	8	29
	100	2%	Dip—110°F	1	9	5	29
F-48	100	2%	Dip—80°F	0	10	2	18
	100	2%	Dip-stand	1	10	3	18

*Percentage of 8-Hydroxquinoline sulphate used in preparing the solution.
**100 oranges were used for the treatment and 100 for the check in each case.

Discussion

Since the above work is experimental, recommendations for the commercial use of the 2-Aminopyridine and 8-Sodium quinolate are not yet in order. Just as for Thiourea they will have to have the approval of the Food and Drug Administration.

Another phase of the problem is the cost of such treatments, which would be somewhat high at the present prices of these compounds. However, if their use becomes general in citrus fruit treatments a greater volume should enable chemical companies to furnish them at lower prices.

The results above presented show that both chemicals are effective in controlling decay in oranges and it is hoped they will find use in the citrus industry.

Production efficiency on the well managed farm has kept pace with production efficiency in industry.

We Thank You...

Your patience during the trying period of the War is appreciated.

Resumption of Peace Time Service will come to you as rapidly as possible.

Florida Telephone Corporation

Serving 14 Counties in Florida
Headquarters: Leesburg, Fla.

EFFECT OF FERTILIZATION ON COLD DAMAGE

(Continued from Page 7)

minor elements. Camp asserts that the increased volume of Florida crops is the result of these minor elements to a far greater degree than it is the result of new trees coming into bearing and old trees providing a natural increase in production.

It is truly amazing what the various experimental blocks of citrus trees at the Station show to one who can read and interpret them as Camp can do. It is likewise virtually impossible to estimate the enormous value of the research work done by Camp and his corps of assistants to the industry.

Much of the work carried on thus far has had to do with improved production methods, although varied experiments have been conducted dealing with packing, shipping, etc., but by the beginning of the next season the station will be equipped as never before to carry on experiments which will doubtless prove of much value to packers and canners of citrus fruits.

Nearly completed are two units, one to be devoted to problems incident to the handling of fresh fruit in preparation for market, and another devoted to the canning of citrus fruits. Each building is 60 by 120 feet and both are of the most modern design, air conditioned and designed specifically to treat the fruit handled in the most scientific manner.

In each building are numerous completely equipped laboratories where experiment station technicians are constantly at work seeking to find the answers to the numerous problems which affect the shipping, packing and processing of citrus fruit.

A new administration building is also in process of construction which will house the offices of the director and other officials at the station, provide space for their library and also includes an auditorium where citrus growers and others can hear first hand of the research findings of the station.

All of which is a far cry from the poorly equipped and undermanned department which existed when Dr. Camp first assumed charge in 1935.

Bankers To Study Needs Of Florida Agriculture

Approximately 150 Florida bankers will go to school for four days at Gainesville as the fifth short course for bankers opens on the University of Florida campus June 9 under the joint sponsorship of the General Extension Division and the Florida Bankers association, B. C. Riley, dean, has announced.

Especial emphasis will be placed on the relation of the state's financial institutions to the agricultural interests of the state. Included on the program in addition to lectures by University of Florida agricultural and economic authorities is a four-hour tour of the agricultural projects in progress at the university.

Theme of the 1947 short course is "How Banks May Better Serve the People of the State of Florida."

Among university faculty members who will teach at the short course are Dean Walter J. Matherly of the college of business administration; Dr. A. P. Black, professor of chemistry and authority on water supply and conservation; Dr. A. F. Camp, vice-director in charge, citrus experiment station, Lake Alfred; A. L. Shealy, head professor af animal husbandry, college of agriculture, and W. E. Stokes, head, department of agronomy, agricultural experiment station.

In a special session on the citrus industry, Dr. Camp and L. G. McDowell, director of research for the Florida Citrus Commission, will discuss some of the technical problems involved in citrus culture and processing.

Students will also have an opportunity to study problems of bank administration under the guidance of outstanding banking specialists from Florida and the nation, including George R. Amy, secretary, country bank operation, Commercial American Bankers association, of New York City, Lewis Gordon vice president, Citizens and Southern Na-

(Continued on page 22)

AMES Perf-O-Rain

your PROFIT

LIFE*

FOR YOUR CROPS

QCL ALUMINUM and GALVANIZED Steel Portable Irrigation PIPE

- Inexpensive — Light Weight.
- Low Operating Cost — Even Distribution.

Plan Now — Insist On Ames

Serving Florida Agriculture For More Than 15 Years.

DISTRIBUTED BY
The Cameron & Barkley Co.
107 S. Franklin Tampa
112 Alexander Place Orlando

MANUFACTURED BY
W. R. Ames Company of Florida
3905 E. Broadway
Tampa 5, Florida

BUILDERS FOR TOMORROW

Americans can well look to 4-H Club members and Future Farmers of America for future leadership. These boys and girls are preparing TODAY to help build a better world of tomorrow. We salute the 4-H Club and F.F.A. members and promise to work to bring them the type of modern rural telephone service that will meet their progressive ideas.

PENINSULAR TELEPHONE CO

ADVERTISEMENT—LYONS FERTILIZER COMPANY

The LYONIZER

Department

COMPILED BY THE LYONS FERTILIZER CO.

Reports Of Our Field Men . . .

POLK COUNTY
J. M. (Jim) Sample

We are about through with our summer application of fertilizer and for the first time in several years growers are placing a great deal of emphasis on mixtures and poundage that will result in quality fruit even if it is necessary to sacrifice a few boxes. This is as it should be as we certainly did not have the finest quality during the present season. We had a very heavy bloom in this county but at the present time it appears that we are going to have a light crop of oranges during the coming season. We have had extremely heavy droppage of new fruit on all varieties and in many cases the loss has been practically 100 percent. This is true especially in the case of groves that were badly damaged by the early spring freeze. A number of canning plants have closed and a few packing houses are closing for the season. We still have a considerable tonnage of grapefruit to move to market and also quite a few valencia oranges.

HILLSBOROUGH & PINELLAS COUNTIES
C. S. (Charlie) Little

At this writing it is awful dry in this territory and groves are beginning to suffer badly. Growers that have their groves equipped for irrigation are running them to capacity. The set of new fruit in this section seems to be light on valencia oranges and marsh seedless grapefruit. Other varieties have set a very nice crop. However, this dry weather is causing some of this fruit to drop. We still have quite a few oranges and grapefruit to move and the market is very bad. Fruit buyers are showing very little activity. We are about through with our summer application of fertilizer which was applied a little earlier this year than as a general rule. All of our mixtures contained ample amounts of secondaries. We have had a great deal of trouble during the past few years in controlling scale insects and this spring it was almost a general practice to use a combination copper and oil spray.

NORTH CENTRAL FLORIDA
V. E. (Val) Bourland

Watermelons are beginning to move from the Lake County section and the first cars shipped brought very good prices. It will be 10 days to two weeks before shipments are heavy and of course at that time it is expected that prices will decline to some extent. Winds did considerable damage to the crop this spring and heavy rains during the early part of the season were also damaging. We are well under way with our summer application of fertilizer to grove property and this will be over by the latter part of June. Growers are very busy with their spray machines in an effort to keep various pests and fungus diseases under control. The fruit season is rapidly coming to a close. A number of packing houses have been slow in moving their valencia crops but are now trying to get through as soon as possible.

SOUTHWEST FLORIDA
Eaves Allison

That big citrus crop from the heavy flush of bloom isn't setting as well as we had hoped for earlier in the season. A lot of droppage has been noted over most areas in this section and it is very likely that the trees will come through with only a very normal crop. Anyhow, right now the next marketing season is a long way off and we still have a considerable quantity of the present season's grapefruit and valencia crop remaining on the trees to worry about. Tomatoes and cukes are moving from Fort Myers, Ruskin and Wauchula, and at this writing the prices are high. It is likely that quite a few farmers will get by this spring with a profit after all, which just goes to show that one never knows. It seems that everybody's guess about everything this season has been consistently wrong. Fertilization of truck crops and gladiolus is over with now, but the summer application to citrus groves is going on in good order with the growers paying plenty of attention to quality goods containing plenty of secondaries.

WEST CENTRAL FLORIDA
E. A. (Mac) McCartney

Most growers in this section have had a fairly good season in spite of the many hazards. We were fortunate enough to be only slightly damaged by the freeze, but prices have been discouraging on some varieties of fruit, but taking the season as a whole most growers will realize a profit from the season's operations. Vegetable growers were not so fortunate and most of them had losses during the season that were never overcome. We are well under way with the summer application and this will be completed by the middle of June. Our growers are very quality conscious and have been using well balanced fertilizers carrying ample amounts of secondary plant foods. Our spray program is well under way and will be followed through the entire season in an effort to have unblemished fruit for the market when the market opens in the fall. Many growers are planning to take advantage of packing house labor during the summer months to take care of their pruning and other odd jobs that are necessary on grove properties.

SOUTH POLK & HIGHLANDS COUNTIES
R. L. (Bob) Padgett

We had a large acreage of grove property in this territory that was completely defoliated during the freeze and these properties have no fruit at all to a very, very light crop. Other groves that were less severely damaged have an inside crop of fruit and on other properties that were not touched by the cold we have a good crop of fruit. However, it is getting dry in this section and we are having a heavy droppage of the new crop of fruit. All of this indicates that we will not have a heavy crop of fruit for the coming season. Regardless of the cold damage and the light crop, growers are going forward with their summer application of fertilizer, applying complete mixtures with plenty of secondaries to take care of the requirements of the tree.

ADVERTISEMENT—LYONS FERTILIZER COMPANY

Seems as how it takes almost a catastrophe to bring about improved conditions that sometimes turns out to be blessin's. Take this present fruit season, fer instance, which certainly ain't been profitable to the growers of the state as a whole, nor to the shippers nor anybody else connected with the growin' and marketin' of citrus . . . fer the past several years we bin a gettin' mighty good prices fer our fruit, regardless of what kind of fruit it was, with the result that all we bin tryin' to do is to raise as many boxes to the tree as possible and not giving much thought as to what kind of fruit it turned out to be.

So this season we produced about the poorest quality of fruit ever produced in Florida, and if'n the high prices had continued we'd a kept on growin' that kind of fruit . . . and in a few years the Citrus Industry woulda been ruined . . . but now that we've had a bad season we're doin' our best to pay some attention to quality again and lest we miss our guess next season is goin' see the market situation a heap better 'cause we're goin' to give the customers a much tastier fruit and have it reach 'em in a lot better condition than we bin doin'.

The Lyonizer Corporation of Lakeland has turned out a jim dandy little fertilizer spreader that they're callin' the Piedmont . . . the machine is all steel construction and the hopper holds 200 pounds of fertilizer, with a dual control that lets it spread on both sides at once and it'll spread 30 feet . . . and users say it spreads even at all times and with all applications . . . reports have it that Florida growers like it and say it's something they've needed for a long time.

Ten counties of the state produce 76 percent of all the vegetables in Florida 'cordin' to a U. S. Crop reportin' service . . . and in the past seven years the acreage devoted to vegetable crops has increased from 190,000 to 250,000 acres in these ten counties . . . Palm Beach, Broward, Dade and Alachua have been at the top of the heap since the 1939-40 season, while the others in the ten top counties are Hillsborough, Marion, St. Johns, Lake, Seminole and Gilchrist. Lake and Gilchrist replaced Manatee and Sumter on the list of major producers, Manatee droppin' to 12th place and Sumter to 13th. Hillsborough jumped from eighth place to fifth, Marion from seventh to sixth while Seminole stayed in the ninth place.

With a lot of packin' houses closin' there ought to be plenty of labor to do the extra grove work for the next few months . . . there's a lot of dead wood that ought to be taken out of the groves this summer.

Uncle Bill

The Effect Of The 1947 Freeze On The Condition of Temple Oranges

Freezes occur occasionally in all of our States that produce citrus fruit. These periodic cold spells may cause only minor damage, or they may be so severe as to seriously damage citrus trees and cause the loss of fruit worth millions of dollars. The freeze that occurred in Florida the week of February 6, 1947 was severe and caused widespread damage.

At the U. S. Horticultural Field Laboratory, in Orlando, Florida, investigations are being made on the changes in composition of citrus fruits that take place during their development and ripening on the tree. Since studies on Temple oranges were in progress at the time of the freeze, comparative tests were made on sound and frozen fruits to determine the effect of the freezing on changes in composition.

In view of the wide interest in the subject this preliminary report is being released at this time. The results show how the amount and quality of the juice was affected as a result of freezing.

The fruit was obtained from plots that had been sampled regularly throughout the season in 5 commercial groves. The results are presented in Table 1. The analyses were made on two dates, one on March 1-5, about one month after the freeze, and another on April 1-5, about two months after the freeze. The fruits in each sample were classified and subdivided as unfrozen or frozen on the basis of careful observation of the juice sacs of the cut stem end and of the center cut, according to usual inspection methods. The degree of damage ranged from slight to very severe. In the severe samples drying out occurred throughout the entire fruit.

TABLE 1: Effect of grove freezing damage on the condition of Temple Oranges 1/

VARIETY AND ROOTSTOCK	CONDITION	LOCATION	Weight per fruit	Juice per fruit	Juice per 100 Gr. of fruit	Juice per fruit	Ascorbic Acid per Ml. of juice	pH	Total Solids	Total Acidity	Solids—Acid Ratio	Numerical Ratings (Taste) 2/ 3/
			Mar. 1-5	Mar. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5	Mar. 1-5	Apr. 1-5
			Gm.	Ml.	Ml.	Ml.	Mg.		Pct.	Pct.		
Temples on rough lemon:	Unfrozen	Alturas, Florida	343	167	49	143	.51	3.82	11.57	12.77	.87	13.30	17.99	85-2	81-3
	Frozen		311	142	46	80	.39	4.16	10.92	11.37	.63	17.33	25.27	65-3	64-3
Temples on rough lemon:	Unfrozen	Lake Wales, Florida	289	169	59	173	.54	3.72	13.29	13.12	1.00	.88	13.29	14.91	94-2	85-2
	Frozen		285	159	56	162	.52	3.82	13.05	12.37	.94	.73	13.88	16.95	84-3	75-3
Temples on rough lemon:	Unfrozen	Lake Wales, Florida	304	172	56		.48	3.70	12.74		.81	15.73		95-2		
	Frozen		327	175	54		.44	3.82	12.00		.65	18.46		80-3		
Temples on sour orange:	Unfrozen	Dundee, Florida	300	327	176	186	59	57	.61	.60	3.57	3.73	13.75	13.94	.90	.75	15.28	18.59	96-2	90-2
	Frozen		317	332	160	168	50	51	.53	.54	3.72	3.94	12.75	12.89	.67	.56	19.03	23.02	76-3	68-3
Temples on sour orange:	Unfrozen	Lake Wales, Florida	299	305	163	174	55	57	57	60	.55	.56	3.60	3.63	13.67	14.74	1.10	1.10	12.43	13.40	94-2	92-2
	Frozen		308	330	163	171	53	52	55	54	.56	.54	3.67	3.65	13.67	14.14	.93	.96	14.70	14.78	84-3	84-3

1/ Freezing temperatures occurred the week of February 6, 1947. Collections and analyses of fruit were made about one and two months later—on March 1-5, and April 1-5, 1947.
2/ Pleasantly tart to sweet.
3/ Insipid.

Results

The data obtained show that the freezing of Temple oranges affected both the amount and quality of the juice, as compared with undamaged fruit. The frozen fruits contained less juice and had a lower content of total solids, total acid, active acidity (pH), and ascorbic acid (vitamin C). The juice of frozen oranges was flat, insipid or characterless in flavor and at all times had a higher solids-acid ratio. These two characteristics are closely correlated in any citrus fruit: and in this particular case they appear to result primarily from the marked reduction in the acidity of frozen fruits, even in the first samples collected, and the further circumstance that the reduction in acid was generally greater than that for total solids. Frozen fruits were also notably lacking in aroma.

However, no pronounced off flavors were noted in frozen fruit at time of picking, either one or two months after the freeze. Changes in some of the chemical constituents suggest that there was a higher rate

(Continued on page 22)

1/ By Paul L. Harding, horticulturist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture.

Clayton Is Named Director Of State Extension Service

H. G. Clayton, state director for the Production and Marketing Administration, has been named director of the University of Florida Agricultural Extension Service, effective July 1, by the State Board of Control, according to an announcement by Dr. H. Harold Hume, provost for agriculture.

His appointment is subject to confirmation by the U. S. Department of Agriculture Extension Service. He will succeed A. P. Spencer, who is retiring June 30 after nearly 37 years with the University of Florida.

A native of Ocala and graduate of the University of Florida, Mr. Clayton has been connected with the Extension Service since March 26, 1917, when he became county agent in Manatee County. On October 4, 1919, he was named district agent and supervised the work of a number of county agents for nearly 14 years.

With the establishment by Congress of the Agricultural Adjustment Administration in 1933 Mr. Clayton became head of this new agency in Florida and has been its director, through various changes in name, since that time.

At the same time he has been continued on the staff of the Extension Service, with which he has cooperated in the adjustment and conservation programs.

Mr. Clayton has been instrumental in securing for Florida and the South many beneficial rulings and developments that have advanced farm living and conservation and improvement of soil resources.

He has encouraged widespread development and improvement of Florida pastures, to keep pace with the rapid advancement in the state's cattle industry. That Florida now has well over 700,000 acres of improved pasture is largely due to AAA assistance.

A veteran of World War I, he is a member of The American Legion, Epsilon Sigma Phi, honorary organization of long-time extension workers, the Baptist church and other groups.

Mr. Clayton will be the fourth man to head the Florida Agricultural Extension Service since its inception in 1914. Dr. P. H. Rolfs was director from 1914 through 1920. Dr. Wilmon Newell became director on January 15, 1921, and continued in that capacity until his death on October 25, 1943. Mr. Spencer has been at the helm since November 1, 1943.

STAHL LEAVES STATE EXPERIMENT STATION FOR OTHER RESEARCH

Dr. A. L. Stahl, who developed a successful process for concentrating citrus juice by cold instead of heat, has resigned from the University of Florida Agricultural Experiment Station and will enter other research work June 1, according to Harold Mowry, Station director.

His method of concentrating citrus juice by freezing and centrifuging, developed at the Station in

(Continued on page 22)

Build and Retain Tree Health

Through the use of good

Florida Favorite Fertilizers....

Sound, healthy trees not only carry their crops well and produce high quality fruit, but they withstand the ravages of weather, more effectively than trees which have not received adequate and proper fertilizer.

Florida Favorite Fertilizers contain all the needed plant foods and adequate amounts of essential secondaries.

Remember, too, that we deliver your fertilizer to you in our own fleet of trucks.

Florida Favorite FERTILIZER, INC.

Old Tampa Road Lakeland, Florida

THE ROLE OF BIOLOGICAL BALANCE IN CITRUS INSECT CONTROL

(Continued from page 5)

Changes in temperature may materially alter a scale control program. The first day of February the author was called in to look at a series of groves which the owner believed had too much red scale. Although the individual blocks had different intensities of scale infestation, most of them had entirely too much red scale for that time of year. The grower had already sprayed a dormant zinc. DN, and wettable sulfur spray. It appeared that probably the most efficient program would be to use a copper oil on the heavily infested blocks and to follow this with a second oil about July 1. Then came the freeze. In mid-March when the groves were again checked, it was found that reduction of red scale populations had been so great that two oil sprays would probably be unnecessary on most of the acreage. Thus, weather conditions had made it possible to decrease the number of oil sprays.

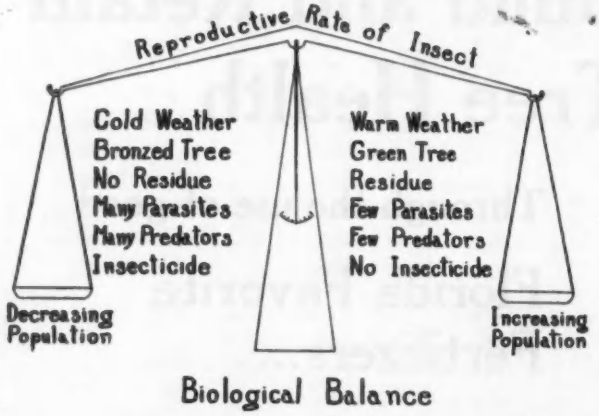


Figure 1. An illustration of factors effecting the balance between scale insects and a citrus tree.

In a series of observations on red scale populations from as far south as Lake Placid to as far north as Weirsdale, and from as far west as Lakeland to Vero Beach and Cocoa on the east coast, there was an apparent reduction of around 75 percent in total populations. Most of the female red scale will reach maturity in late April and there will be a period of pronounced crawler activity starting at that time. In addition to reductions in population, this means that, as compared with 1946, red scale populations will be a month slower in starting their reproductive cycles in 1947. On the other hand, checks on purple scale infestations indicated that there was little or no reduction for this insect. In some instances there appeared to be a slight increase in population during February and March. Thus, the grower who had too much scale in January, still had too much purple scale the first of March and cold had not resulted in any change in his proposed scale control program. From a purple scale standpoint, the only beneficial effects were that reproduction was reduced during the cold weather and that peaks of crawler emergence have been delayed and, as for red scale, will probably occur about one month later than in 1946. This will mean that should there be an early fall in 1947, we will have one less generation than occurred last year when we had an early spring and late fall. In spite of the defoliation of trees possessing scale populations and in spite of the mortality of red scale due to cold, it is to be expected that scale infestations will reach normal proportions during the summer. The reproductive capacity of red scale discussed below makes this fact obvious for that species. In the case of purple scale, succulent inside growth on defoliated trees will be infested from scale surviving on the wood (See Thompson, 3). This type of growth is especially susceptible to purple scale and it is to be expected that heavy infestations may result.

When considering the number of generations and the speed of increase of a scale population, it is of interest to note the differential in reproductive potential between Florida red scale and purple scale. Dr. Spencer (6) of the USDA laboratory at St. Lucie has reported that under specified laboratory conditions a purple scale female may lay a maximum of 63 eggs and they may be produced at a maximum of only five per day. On the other hand a Florida red scale female may lay a maximum of 334 eggs and may lay them as rapidly as two per hour. A purple scale egg hatches after 13 days incubation while a red scale egg usually hatches within 24 hours after oviposition. Assuming that there is a 50 percent mortality among hatched eggs, and that of the remaining 50 percent half are females, it may be calculated that from one red scale female, there will be, at the end of three generations, a total of about 100,000 red scale. From one purple scale female there would be only 7,000 individuals at the end of three generations. This is a differential of 7 to 100. For red scale, three generations would take about five months, roughly May 15 to October 15, but for purple scale the time required would be about 8 months. If we figure that a 5 box orange tree has 50,000 leaves, one red scale female in May would result in a population of two scale per leaf in October. Last summer actual red scale populations in one observed grove went from less than 0.1 scale per leaf to more than 200 per leaf in a three month interval. This then is the reason for the idea that one should apply a summer oil for red scale if he can find any live scale at all in May or in June. This probably is also the major reason why many growers have felt that red scale was harder to kill than purple scale. They kill as easily, but they grow so much faster.

The detrimental as well as beneficial results of a spray application must be determined when considering "Biological Balance". Oil kills scale, but the residue left by some sprays seems to result in increased scale populations. There is much to be learned about the role of residue in increased scale populations. There is much to be learned about the role of residue in insect population increases. Is it partly a chemical factor or is it altogether a physical one? In any case, it is known that some insecticides are actually detrimental to certain types of insect control. The effect of DDT on Florida red scale is of course an outstanding example. It kills the parasites and predators of red scale much more readily than it kills red scale itself. This means a scale population unhampered by parasites or predators. As previously reported

by Griffiths and Thompson (1), population increases following the use of DDT were out of all proportion to normal expectancy. There is reason to believe that some other materials may result in similar, but less spectacular upsets of parasite-pest ratios. Work is proceeding to determine these effects.

An understanding of scale populations may make it possible to time sprays more satisfactorily for scale control. There is considerable evi dence to indicate that both red and purple scale have definite periods when oviposition activity reaches a maximum. It is felt that this is probably a poor time to use an oil spray. Thus, for maximum scale control, an oil spray should be applied when there is a minimum of crawlers. Table 1 shows what happened last year in the case of three groves where there were red scale infestations. Heavy populations were present in all instances. Three columns are shown in Table 1. The percent mortality figures represent the number of scale which were present and killed at the time of the spray application. The other two columns represent the percent control or reduction from the initial population at intervals of 15-20 and 30-40 days after spraying. The Lake Alfred grove was sprayed in May when there was a minimum of crawler ac tivity. The other two were sprayed in July during a peak oviposition period. In the former case there was a lower initial mortality, but there was a prolonged period of control. Although no figure is shown for 40 days after spray, population estimated showed very low infestations for two months and longer after treatment. In the latter two instances, although initial mortalities were higher than at Lake Alfred, scale populations were up to 50-70 per cent of pre-spray levels within 40 days after spray. This is not conclusive evidence in itself, but it suggests that if timing is properly determined, an individual grove which is regularly infested with red scale may be so managed as to necessitate only one oil spray per year.

On the basis of preliminary data, red scale populations appear to follow similar oviposition patterns throughout the state, and a similar trend has been noted for purple scale. With a more thorough understanding of such information, it is possible that spring predictions concerning scale populations can be made. These predictions could then be utilized in planning scale control programs.

These are only a few of the many aspects of "Biological Balance" and "Biological Control". It is believed that as data accumulate, growers can make a still more efficacious utilization of present insect control methods.

Table I. Effects of Oviposition Activity on Red Scale Reinfestation.

Date and Location of Spray	Per Cent Mortality	Per Cent Control After 15-20 Days	30-40 Days
May 1			
Lake Alfred	82	79	—
July 11			
Lake Placid	91	77	29
July 25			
Lake Alfred	95	82	51

Literature Cited

1. Griffiths, J. T. and W. L. Thompson. A preliminary account of the use of DDT on citrus in Florida. J. Econ. Ent. In press.

2. Thompson, W. L. Some possible reasons for the increase of purple scale infestations. Cit. Ind., 19 (12): 6-7. 1938.

3. ————. The status of citrus pest following the recent cold. Proc. Fla. St. Hort. Soc., 53:6-7-72. 1940.

4 ————. Cultural practices and their influence upon citrus pests. J. Of Econ. Ent. 32.782-789. 1940.

5. ——— The effect of magnesium deficiency on infestations of purple scale on citrus. J. of Econ. Ent., 35:351-354. 1942.

6. Spencer, H. Biology of the purple and long scales of citrus in Florida. USDA, Bur. of Ent. and Pl. Quar., Div. of Fruit Insect Investigations, St. Lucie, Fla. Quarterly Report, 4th quarter, pp. 8. 1946.

Extra safety precautions will prevent disabling accidents.

ALLEN & CO.

Investment Securities Listed & Unlisted Stocks & Bonds

Inquiries Solicited

211 East Lemon St.
Phone 2133 Lakeland, Fla.

Branch Office
604 Metcalfe Bldg.
Orlando, Florida

Give your crops the full advantage of thorough spraying with these phytonomic oil sprays. They aid in sooty mold removal.

These are 90% oil sprays, ready for dilution with the required water. Spray thoroughly. It costs little, pays well.

VOLCK 90 OR N-P 90
REG. U.S. PAT. OFF. REG. U.S. PAT. OFF.

PHYTONOMIC OIL SPRAYS

Consult your ORTHO fieldman for guidance as to the best time to spray against any particular pest condition.

CALIFORNIA SPRAY-CHEMICAL CORPORATION
ORLANDO FLORIDA

ORTHO

Rebuilding Citrus Trees

(Continued from page 13)

works a tree in the spring or early summer he cuts off only part of the old top and leaves at least one strong branch to "support" the roots as well as afford shade. In the fall he uses a few hegari stalks to provide frost protection.

If his buds are not inserted until fall, Mr. Bennett may not cut off any old top at all until the following spring. Thus the buds are well protected through the cold weather. In all cases he is guided by the tree's condition and location—and he never does his cutting back all at once. Then he revisits the tree frequently, and it's a year or more before he regards his job as finished.

Last spring Mr. Bennett topworked between 400 and 500 trees in various groves. Not until next spring, at least, will he turn them over to the owners. Until then they are his care and responsibility — except, of course, for regular irrigation and cultivation. He says that in about three years from the time he put in the new buds, those trees will be about as large as they ever were, and that the cost will be considerably less than planting and caring for new trees through the same period.—Arizona Producer.

"THE EFFECT OF THE 1947 FREEZE ON THE CONDITION OF TEMPLE ORANGES"

(Continued from page 18)

of metabolism in frozen than in unfrozen fruits.

Changes in weight, or difference in weight among the different samples, did not show trends consistent enough in one direction to justify any attempt to draw conclusions from them.

STAHL LEAVES STATE EXPERIMENT STATION FOR OTHER RESEARCH

(Continued from page 19)

collaboration wit hthe Florida Citrus Commission, has been the basis of a potentially important commercial industry.

He also made important contributions to Florida's vegetable and fruit industries with studies on pliofilm wrappers for fruits and vegetables, cold storage of citrus and other fruits, quick-freezing and dehydration.

He has been a member of the Experiment Station staff for the past 19 years.

BANKERS TO STUDY FLORIDA AGRICULTURAL NEEDS

(Continued from page 15)

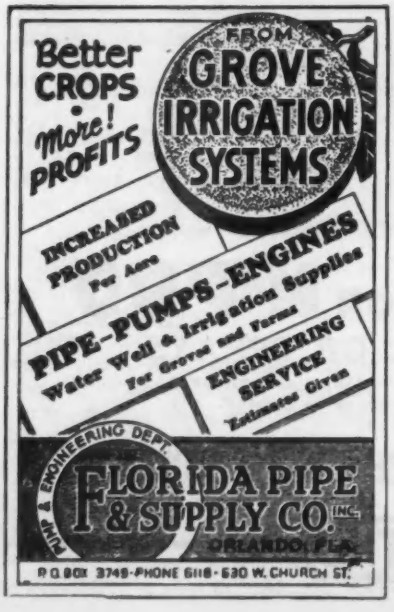
tional Bank, Atlanta; E. F. Longinotti, vice president, Union-Planters National Bank and Trust company, Memphis, V. H. Northcutt, executive vice-president, First National Bank of Tampa.

Members of the short course committee are Frank W. Sherman and Chas. D. Wynne, of Jacksonville; E. W. Johnson and F. Otto Anderson of Tampa, Godfrey Smith, Tallahassee; Ralph H. Sefton, DeLand; Milton Campbell, Belle Glade; R. L. Dewey, Ocala; J. L. Howell, Everglades; and Bert C. Teed, Palm Beach.

SOUND ORANGES MAKE SUPERIOR FROZEN FRUIT

The necessity for using the juice of only sound oranges for the preparation of frozen juice is underlined by work reported recently from the Department of Agriculture's Western Regional Research Laboratory, Albany, Calif.

Juice prepared from Valencia oranges damaged by soft rot—having soft decayed spots of considerable size, but lacking visible mold growth—contained as extracted a population of microbes 2,500 times greater than did juice similarly prepared from sound fruit. Even after immediate freezing and storage at zero Fahrenheit for 8 months, the frozen juice of the "soft rot" oranges contained far more bacteria than the fresh frozen juice from sound fruit.



Classified Ads

PEACH TREES. IMPROVED JEWEL Variety. Accepting reservations for January—February delivery. Place reservations early to insure delivery.

Clay Hill Nurseries Co.
Box 2880, Tampa, Fla.

CITRUS TREES for fall and spring delivery. All varieties. F. Gould Garcia, Box 843, Lakeland, Florida.

AVOCADO-MANGO TREES 1947 PLANTING FOR SALE IN QUANTITY. BROOKS-TOWER NURSERIES Box 36, HOMESTEAD, FLORIDA.

SUPERIOR CITRUS TREES. No freeze damage. Principal varieties available for June planting. Order now. Ward's Nursery, Avon Park, Florida.

CITRUS TREES. USUAL VARIETIES and Rootstocks. Accepting reservations for Fall 1947 and Spring 1948 delivery.

Clay Hill Nurseries Co.
Box 2880, Tampa, Fla.

WILL GROW CITRUS TREES ON contract, sour, lemon, or cleo rootstock. John Grieshop Nursery. 1½ miles north of San Antonio. Mail—Dade City, Fla.

BE SURE!

when spraying your citrus trees, use

Standard "87"

Oil Emulsion. It blends with any Florida water perfectly. Our modern machinery and competent supervision assure a uniform hig hgrade emulsion that gets results every time.

We stock and manufacture all types of Insecticides and Fungicides for citrus and truck.

Standard Spray And Supply Company
Lakeland, Florida